

ABSTRACT OF THE DISCLOSURE

The present invention is directed to reliably perform a mass measurement.

A mass measurement apparatus 10 has an excitation circuit 14 to forcibly excite a piezoelectric vibration reed 12. The excitation circuit 14 comprises a PLL circuit 20. In the PLL circuit 20, a voltage controlled oscillation circuit 24 outputs an excitation signal. The excitation signal is supplied to the piezoelectric vibration reed 12 and a phase comparator 26 via a distributor 22. The phase comparator 26 outputs a signal corresponding to a phase difference between an output signal of the piezoelectric vibration reed 12 and the excitation signal. The signal is passed through a loop filter 28 to be converted to a direct-current voltage and supplied to the voltage controlled oscillator 24 as a control voltage. The voltage controlled oscillator 24 has an oscillation frequency varying in accordance with the control voltage, outputs the excitation signal with no phase difference with respect to the output signal of the piezoelectric vibration reed 12, and causes the piezoelectric vibration reed 12 to resonate. A signal processing unit 16 counts the output frequency of the voltage controlled oscillator 24 and calculates the resonance frequency of the piezoelectric vibration reed 12.